



THE OPEN UNIVERSITY OF SRI LANKA
Faculty of Engineering Technology
Department of Mathematics and Philosophy of Engineering
Continuous Assessment Test II (2013\2014)
Diploma in Technology (Level 3)
MPZ3231-Engineering Mathematics IA

Duration: One and Quarter ($1\frac{1}{4}$)Hours

RegistrationNumber :

Date: 23rd April 2014

Time: 1430 hrs -1545 hrs

Instructions

- Answer All Questions
- Number of pages in the paper - 06.
- Non programmable calculators are allowed.
- All symbols are in standard notation.

1. Let $f(x) = x^3 - x - 1$

(a) Find $f(1)$ and $f(2)$.

[02%]

(b) By using the bisection method find a real root of the equation

$$f(x) = x^3 - x - 1 \text{ by considering 9 steps.}$$

[48%]

(c) Find $f'(x)$.

[02%]

(d) By using Newton - Raphson method, find a real root of the equation $f(x) = 0$, correct to three decimal places, with the initial guess, $x_0 = 1.5$.

[18%]

2. Using the Jacobi method find the first two iterations of the following system of linear equations and solve them. (start with $(x_1^{(0)}, x_2^{(0)}, x_3^{(0)}) = (0, 0, 0)$)

$$27x_1 + 6x_2 - x_3 = 85$$

$$6x_1 + 15x_2 + 2x_3 = 72$$

$$x_1 + x_2 + 54x_3 = 110$$

[20%]

3. Considering the function $f(x) = x^{\frac{1}{3}}$

(a) Find the missing values of the following table.

[10%]

x	$x^{\frac{1}{3}}$	Δ	Δ^2	Δ^3	Δ^4
6	1.817			
8	2.000	0.154	-0.029	0.010	
10	2.154
12	2.289	0.121	-0.014		
14	2.410				

(b) Determine $7^{\frac{1}{3}}$.

[60%]

4. Solve the following differential equations:

(a) $x^2(y - 1) + y^2(x + 1)\frac{dy}{dx} = 0$ [20%]

(b) Verify that the following ordinary differential equation is exact, and obtain its general solution.

$(x^2 + y)\frac{dy}{dx} + 2xy = e^x$ [20%]

End

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